difficulties connected with the ascents of high mountains.

This subject he was particularly fitted to investigate, for he had probably climbed to heights above 20,000 ft. more often than anyone else. For instance, in 1910, in the Sikkim Himalaya, he was nine times above 20,000 ft., the highest altitudes being the first and only ascents of Pawhunri, 23,180 ft., and Chumiomo, 22,430 ft.

He also visited other parts of the Himalaya, the Nanga Parbat district, north of Kashmir, and Garwhal, where last summer he reached 23,600 ft. on Kamet. It was, however, in Sikkim that he did most of his mountaineering.

From time to time he published papers and reports in the Journal of the Royal Geographical Society and in the *Alpine Club Journal*. But as he was of a retiring disposition, there are few accounts of his extraordinary mountaineering record. Perhaps his most important paper was on "A Consideration of the Possibility of Ascending the Loftier Himalaya" (Journal of the Royal Geographical Society, 1917), in which he discussed all the factors conditioning acclimatisation to high altitudes, and the question whether it was possible to climb Mount Everest. His conclusion was: "A man in first-rate training, acclimatised to maximum altitude, could make the ascent of Mount Everest, without adventitious aids (*i.e.* oxygen), provided that the physical difficulties above 25,000 ft. are not prohibitive."

Dr. Kellas had a unique knowledge of the Sikkim Himalaya, and his death has deprived the Mount Everest expedition of one of its most valuable members, for he had studied the geography of the country round Mount Everest more deeply than anyone else.

We regret to report the death, on June 26, of Mr. William Shackleton, at the age of fifty. Mr. Shackleton received his early training at the Keighley Institute, and after completing a three years' course at the Royal College of Science, became an assistant to the late Sir Norman Lockyer. By his skill and enthusiasm he contributed largely to the success of the early work at South Kensington on the photography of stellar spectra. In 1893, in company with Mr. Albert Taylor, he observed the total eclipse of the sun in Brazil, and was one of the first to obtain photographs with a prismatic camera of adequate power. In 1896, with Dr. E. J. Stone, he took part in the expedition which was conveyed to Novaya Zemlya by Sir George Baden-Powell in his yacht *Otaria*. Favoured by a brief interruption in a snowstorm, he then achieved a notable success in photographing for the first time the complete "flash" spectrum, with perfect definition, notwithstanding that an accident to the yacht had left but little time for preparation. On this occasion some admirable photographs of the corona were also obtained under his supervision. This expedition was further memorable for a meeting with Nansen at Hammerfest on his return from the polar regions.

For some years Mr. Shackleton was occupied with the late Dr. Common in the design of range-finders and other optical instruments, and a special interest in optics was added to that in astronomy during the remainder of his life. In 1905 he took up an appointment at the India Stores Depôt as Inspector of Scientific Supplies, and scientific workers in India have profited much from his extensive technical knowledge and careful supervision of their requirements. Mr. Shackleton was elected a fellow of the Royal Astronomical Society in 1893, and of the Optical Society in 1913. He was secretary of the Optical Society from 1916 to 1920, and rendered valuable services to the society in that capacity, besides contributing papers of practical importance; he was a vice-president of the society at the time of his death. Mr. Shackleton's health had not been good for several years, but his death came unexpectedly, and will cause deep regret to his many friends in scientific and technical circles.

Notes.

A chemical laboratory of a new type was opened at the Imperial College of Science and Technology by Mr. A. J. Balfour on June 24. The laboratory is fitted with apparatus of a size which will render it necessary for chemical processes to be carried out under conditions closely resembling those which are present on the large scale. Just as the ordinary scientific laboratory contains specimens of all types of apparatus necessary for small-scale work, the new laboratory contains appliances which will enable the student to carry through the corresponding large-scale operations in a manner which will render it possible for him to study the influence of those factors, such as heat exchange, etc., which are not of vital importance in ordinary laboratory work. Students, and especially research students, whether they intend to follow an academic or an industrial career, will thus obtain a knowledge of large-scale conditions which it has hitherto been possible to acquire only by actual works experience. Moreover, the means for preparing initial material in large quantities will be of the greatest value for the research workers in the chemistry department of the college. It is hoped that a full description of the new laboratory, with illustrations, will appear in a forthcoming number. The equipment was provided by Mr. W. G. Whiffen, an old student of the college.

We learn from the *Times* of June 24 that the West London Hospital is in possession of electrical plant capable of delivering current at 200,000 volts for X-ray purposes. The X-rays are of a penetrating character, and are being used for the treatment of patients suffering from malignant disease, on the lines laid down by the Bavarian doctors Seitz and Wintz. The use of more and more penetrating X-rays in medical work has been a gradual growth, and, quite apart from any marked differential action which the short wave-length radiation may have on cancer cells as compared with the longer wave-lengths, the employment of the more penetrating rays has technical advantages when dealing with deep-seated tumours. One sees in their use a natural development which depends very largely upon the electro-technician. It is greatly to be deplored that statements as to how this development may improve the results of cancer treatment are based, not upon facts, but upon the hopes of those engaged in this work. The use of X-rays and of radium in the treatment of cancer has been justified by results, and these results continue to improve, but we think that the public may be expecting more than is warranted when it is told that "a conservative estimate of the possibilities of the new treatment is to put the number of cures in the future at double that ever known in the past."

ON June 27 the president of the Royal Society of Arts, the Duke of Connaught, presented the Albert medal of the society to Dr. J. A. Fleming "in recognition of his many valuable contributions to electrical science and its applications, and specially of his original invention of the thermionic valve, now so largely employed in wireless telegraphy and for other purposes." It may be of interest to recall the important part that Dr. Fleming played in the development of the thermionic valve and its applications to wireless telegraphy and telephony. The first form of valve was made in 1904, and led to revolutionary developments in that and other branches of electrotechnics. It is perhaps less generally realised that he gave scientific assistance in the early developments of "wireless" so far back as 1899, and directed some of the constructional work in connection with the first long-distance station at Poldhu. Dr. Fleming was also actively connected with the early progress of electric lighting in this country. In 1882, and for twelve years after, he held an advisory position with the Edison Electric Light Co., of London, and later with the Edison and Swan Co. He carried out the installation on board one of the first ships of the Royal Navy to adopt the new illuminant when it was introduced in 1882, and during succeeding years assisted several of the London companies and provincial corporations in electric lighting matters. Still older is his connection with telephony, for so far back as 1879 he was scientific adviser to the Edison Telephone Co., formed to begin telephone-exchange working in London. Other scientific work which Dr. Fleming has accomplished includes an important research into the electric and magnetic properties of matter at very low temperatures carried out in conjunction with Sir James Dewar.

ON June 22 a portrait of Sir Napier Shaw, painted by W. W. Russell, was presented to him by the staff of the Meteorological Office, South Kensington, for preservation in the office. A copy of the portrait was presented to Lady Shaw.

AN International Hydrographic Bureau has been established at Monaco, with the following directors: Vice-Admiral Sir John Parry (Great Britain), Capt. Phaff (Netherlands), and Capt. Muller (Norway). The secretary is Capt. Spicer-Simson (Great Britain).

IT is announced in the *British Medical Journal* for June 25 that the International Labour Office has decided to appoint a committee of experts to deal with the question of industrial hygiene. Accordingly letters have been dispatched to the Governments of Great Britain, France, Belgium, Germany, Holland, Italy, Spain, Sweden, Switzerland, and Japan, inviting each of them to nominate one of its health inspectors or factory inspectors as a member of the advisory committee. The committee will meet from time to time, preferably on the occasion of the International Labour Conference, and its members will keep in touch with the International Labour Office and its industrial hygiene section by correspondence.

THE twelfth annual meeting of the Oxford Ophthalmological Congress will be held on July 7–9, when the following communications will be made:—Discussion on "The Causes of Infection after Extraction of Senile Cataract," Dr. V. Morax and others; "Stereoskopometry," R. J. E. Hanson; Petrosal sinus sepsis, A. Greene; The Doyne memorial lecture on "Heterophoria," E. E. Maddox; An instrument which is set in motion by the eye, *i.e.* by vision, or by proximity of the human body, *e.g.* the hands, Dr. C. Russ; Experiences of 606 and its substitutes in eye diseases, J. Hern; The trench operation for chronic glaucoma, with account of cases, N. C. Ridley; A plea for early diagnosis and operation in chronic glaucoma, with some remarks upon the treatment of acute glaucoma, Dr. T. H. Butler; A modified operation for chronic glaucoma, P. H. Adams; Some points in the performance of the Lagrange operation for chronic glaucoma, B. Cridland; Loss of vitreous during cataract extraction, Dr. T. H. Butler; Sight-testing with coloured test types, P. J. Hay; Some points of interest in the work of a school oculist, Dr. H. McIlroy.

AN exhibition, free of charge, of Egyptian antiquities from Tell-el-Amarna will be held in the rooms of the Society of Antiquaries on July 5–13, from 10 a.m. to 5 p.m. A lecture on "The Season's Work at Tell-el-Amarna" will be delivered by Prof. T. E. Peet on July 7, at 8.30, in the Royal Society's rooms.

THE seventy-third annual meeting of the Somersetshire Archæological and Natural History Society will be held at Crewkerne on July 19–21, under the presidency of Sir C. Hercules Read, who will deliver his presidential address, "Somerset Archæology—a Suggestion," at 11.20 a.m. on the opening day.

THE first exhibition of prehistoric art, organised by the Society of Friends of Art under the superintendence of the well-known archæologist, Don Elias Tormo, is now being held at Madrid. The object of the exhibition is to display reproductions of the remarkable series of rock paintings from the Spanish caves, the first discovery being that of the Altamira cave-paintings by the small daughter of the archæologist Sautuola in 1879. Since that date discoveries, encouraged by the Prince of Monaco and others, have been made in great numbers. The present exhibition includes what are supposed to be examples of early Iberian script, figures of suns, fishes, horseshoes, women weaving short skirts, drawings of the chase, tiny and most artistic stags from the eastern regions of the Peninsula, and splendid life-size wild boars and bisons from Altamira in the north-west. These figures, in drawing and colouring, are splendid examples of prehistoric art.

BARON EDMOND DE ROTHSCHILD has intimated to the Paris Academy of Sciences his intention to place at the disposal of the Academy the sum of 10,000,000 francs for the purpose of creating a fund for the development of physico-chemical research in France. According to the *Morning Post*, the revenue from the capital sum will be used first for assisting young students who devote themselves to pure science; secondly, to furnish investigators with the means to carry out their work; thirdly, to help inventors who have made discoveries as a result of being assisted by the new foundation to take out patents protecting their discoveries; and, fourthly, to create later on, if it should be deemed necessary, an institute with laboratories to be named after the founder.

AT the annual general meeting of the Röntgen Society, held on June 16, the following officers and council were elected :—*President:* Prof. J. W. Nicholson. *Vice-Presidents:* Dr. G. H. Rodman, Sir Ernest Rutherford, and Sir William Bragg. *Hon. Treasurer:* Mr. G. Pearce. *Hon. Secretaries:* Dr. E. A. Owen and Dr. J. R. Reynolds. *Hon. Editor:* Dr. G. W. C. Kaye. *Council:* C. Andrews, Dr. H. Black, A. E. Dean, Major Kenelm Edgcumbe, N. S. Finzi, Dr. F. L. Hopwood, Dr. F. H. Johnson, Dr. R. Morton, C. E. S. Phillips, Prof. A. W. Porter, Prof. A. O. Rankine, and Sir Archibald D. Reid.

THE seventy-fourth annual meeting of the Palæontographical Society was held in the rooms of the Geological Society, Burlington House, on Friday, June 17, Mr. E. T. Newton, vice-president, in the chair. The report referred to the completion of Dr. Reed's monograph of Bellerophontacea, and the early publication of a new monograph of carboniferous insects by Mr. Herbert Bolton. It also announced further instalments of the monographs of Pliocene Mollusca, Palæozoic Asterozoa, and Pleistocene Mammalia (Hippopotamus). The size of the annual volume had unfortunately to be reduced owing to the higher cost of production and to the difficulty of increasing the membership of the society. Dr. J. S. Flett, Mrs. Longstaff, Mr. A. W. Oke, and Dr. C. T. Trechmann were elected new members of council. Dr. Henry Woodward was re-elected president, Prof. E. J. Garwood was elected new vice-president, and Mr. Robert S. Herries and Dr. A. Smith Woodward were re-elected treasurer and secretary respectively.

THE council of the Society of Chemical Industry has nominated Prof. R. F. Ruttan, of Montreal, as president for the session 1921–22. The council, in view of the fact that the current annual meeting will be held in Montreal, requested the Canadian sections to suggest one of their members for nomination for the office of president, and Prof. Ruttan's name was proposed.

EARLY last year, as announced in NATURE, the Medical Research Council, by the courtesy of the Governing Body of the Lister Institute, made arrangements to maintain a national collection of type cultures at the institute. The scheme is under the general direction of Prof. J. C. G. Ledingham, with Dr. R. St. John Brooks and Miss M. Rhodes as curator and assistant curator respectively. It now appears that mycologists feel the need of a similar collection. Since the formation of such a collection is not at present contemplated by any institution it is considered that the scope of the national collection should be extended. The British Mycological Society has appointed a fully representative standing committee to consider the ways in which the collection can be made most valuable, and to advise and assist in all questions appertaining to fungi. It is proposed to collect and maintain cultures of fungi of importance in phytopathology, medicine, veterinary science, technology and soil biology, types useful for teaching purposes, and any rare or interesting species. At present it is not possible to cope with the innumerable strains of common fungi, and room can be found only for those forms with some published distinguishing name or symbol. The co-operation of bacteriologists and mycologists is earnestly invited, and in return every effort will be made to supply the needs of applicants for cultures. All communications respecting the collection should be addressed to the Curator, National Collection of Type Cultures, Lister Institute, Chelsea Gardens, S.W.1.

THERE was an interesting demonstration of new wireless telegraph apparatus by the R. M. Radio Co. on Thursday last. This company has developed and shown in operation a Morse printing wireless receiver, which, in addition to the ordinary detector and amplifier valves, is provided with another valve, to rectify the currents that would normally go into the receiving telephone circuit, so that a relay can be made to work. The relay is of a sensitive Post Office pattern, and is actuated by upsetting the balance of a Wheatstone bridge arrangement, in one arm of which the valve is connected. The relay controls an ordinary Morse inker, so that a permanent record of the messages is produced. This apparatus is due to Mr. F. H. Haynes, of the R. M. Radio Co., and Mr. V. Ramage, of the Central News, Ltd., and can easily take down messages from Paris, Moscow, etc., as well as from ship installations up to a considerable distance. Capt. H. de A. Donnisthorpe also showed a new form of thermionic valve known as the R.M.R. triode. In this, improved efficiency is obtained by the use of a hemispherical anode which avoids the fringing effect produced by the more usual cylindrical electrodes, and thus utilises the electron stream more completely. In a further development of this apparatus a "soft" tube of this kind is surrounded by a current-carrying coil, which produces a magnetic field having the effect of concentrating the ions where they are wanted, so that an increased flow of electrons is produced, giving a steeper characteristic curve and improving the sensibility by something like a further 50 per cent. The increased anode current when the field was applied was seen by means of an ammeter, and in another experiment the effect of a powerful electromagnet in controlling the position of the glow in a softer tube was demonstrated. It was pointed out that this action is similar to that taking place in the aurora borealis, according to the theory that in the layers of reduced pressure of the upper atmosphere the earth's field concentrates the ions and thus locates the glow produced by the bombardment of electrons shot off from sun-spots. This apparatus, which Capt. Donnisthorpe calls the "Thermagnion," can also be used to produce continuous oscillations with an equal gain in efficiency.

THE tercentenary of the death of Thomas Harriot, the mathematician and astronomer, occurs on July 2. Not only was he the most celebrated English algebraist of his time, but he was also one of the first astronomers in England to use a telescope, and, like Galileo, Fabricius, and Scheiner, was one of the early observers of the spots on the sun. Born at Oxford in 1560, he was a year older than Henry Briggs. He graduated from St. Mary's Hall, and became an ardent student of mathematics forty years before the inauguration of the first university chair of mathematics. At the age of twenty-five he entered the service of Sir Walter Ralegh, by whom he was employed in the survey of the newly founded colony of Virginia. The greater part of Harriot's life, however, was passed in the neighbourhood of London, where he came under the patronage of Henry Percy, Earl of Northumberland who gave him a pension and assigned him rooms at Sion House, which stands on the banks of the Thames opposite Kew. When the earl was confined to the Tower through the complicity of some of his family in the Gunpowder Plot, Harriot and two other mathematical worthies, Thomas Hughes and Walter Warner, often bore him company. They were known as "the three magi." Harriot appears to have passed an uneventful life, and at his death was buried in St. Christopher's Church, on the site of which now stands the Bank of England. A monument erected to his memory was destroyed in the Great Fire of 1666. As an algebraist Harriot is a connecting link between Vieta and Descartes. His "Artis Analyticæ Praxis" was not published until ten years after his death. The revival of his fame as an astronomer was due to von Zach, who, while on a visit to the Earl of Egremont in 1784, discovered some of Harriot's writings beneath a pile of old stable accounts at Petworth Castle; while the reduction of Harriot's observations of the comet of 1607 formed one of the first tasks of Bessel's astronomical career. Some of Harriot's manuscripts are in the British Museum.

AT the annual meeting of the British Pharmaceutical Conference at Scarborough on June 14, Mr. E. Saville Peck, in his presidential address on "British Pharmacy and its Possibilities," said he looked forward to the time when pharmacy in this country shall have established itself as a separate professional entity. It could not be raised to this status without the combined efforts of its members, and would have to move forward with the advance of general education and of applied science. In his opinion every student before registration should be required to pass one of the school leaving certificate examinations which the Board of Education has recognised as equivalent to matriculation. While not advocating any serious extension of the syllabus for the qualifying examination, Mr. Peck favoured the addition of commercial science. In the major examination, which should be renamed the fellowship examination, practical physiological chemistry and bacteriology (with clinical microscopy) should be included among the compulsory subjects, and steps should be taken to establish a degree in science with pharmaceutics as one of the subjects in the final examination. If pharmacy is to take its position with other professional bodies it must bring its final qualification up to university standard. He looked forward to the ultimate evolution of a real profession of pharmacy.

MRS. SCORESBY ROUTLEDGE has made another important contribution to our knowledge of the ethnology of Easter Island in her account of a series of carved rocks and stone houses, published in the Journal of the Royal Anthropological Institute (vol. l., part ii.). The houses built of slabs of stone procured from an adjoining quarry are remarkable. The soil is excavated on a sloping site; the foundations are made of large rough cubes of rock, on which slabs are laid on edge, and the roof is formed of similar slabs. The house is entered by a rectangular tunnel. A series of excellent photographs enables us to understand the methods of construction, and the accommodation provided for the occupants.

IN *Ancient Egypt*, 1921, part ii., Prof. Flinders Petrie explains that the work of the British School has been moving southward, in the course of a systematic clearing of the western bank of the Nile valley. The excavation of the cemetery of Herakleopolis, which had been wrecked in ancient times, provided some important results. In particular, a number of well-dated skeletons gave an opportunity to compare them with those of other sites on either side—Medum, Tarkhan, and Deshashe. This showed important differences between the types of the Second, Sixth, and Ninth Dynasties, but the question whether the interments were those of nobles or of plebeians may to some extent confuse the results.

IN the April issue of the *Entomologist's Monthly Magazine* Dr. R. C. L. Perkins writes on the variation exhibited by the British species of parasitic bumble-bees of the genus Psithyrus. It is evident from the many colour forms which are recorded in this article that variation in these bees has been very inadequately studied. The subject is an interesting one, and species of Psithyrus need to be much more extensively collected before we shall be able to learn the distribution of their varietal forms. Dr. Perkins also refers to the very rare bumble-bee *Bombus pomorum*, Panz. A few examples of this insect were captured by the late F. Smith in Devon in 1857, but since that time the species has been lost sight of in this country. Owing to the resemblance which the male bears to a variety of the same sex in *Psithyrus rupestris*, F., and the similarity of the female to more common Bombi, Dr. Perkins is of opinion that *Bombus pomorum* may have been overlooked, and possibly may be re-discovered by some enterprising entomologist.

PAMPHLET No. 12 (1921) of the Economic Series issued by the British Museum (Natural History) is written by Mr. F. Laing, and deals with the ubiquitous cockroach. In addition to the common species (*Blatta orientalis*, L.), three other kinds of cockroach have established themselves in sufficient numbers in this country to be occasionally troublesome. The general reader is far more interested in their control than in their biology, and Mr. Laing finds that a powder consisting of three parts of sodium fluoride to one part of pyrethrum is a successful remedy. The mixture should be scattered about the haunts of the cockroaches in the evening, and the dead ones removed the next morning. The powder is harmless to any domestic pets and is cheaply and easily prepared.

THE inhabitants of Buckinghamshire and Hertfordshire will be grateful to Mr. W. Whitaker for his memoir on the water-supply of the two counties, recently published by the Geological Survey. In both counties chalk is the principal water-bearing rock, but supplies are also obtained from overlying gravels, sands, etc., Tertiary beds, and the Greensand and Jurassic rocks. The deepest bores recorded are 1000 ft., and from some of the wells more than 1,000,000 gallons a day are being obtained. Numerous analyses of the water are given, and the details are of considerable interest to all concerned in the well-being of the community. The geological student will be particularly interested in the full description of the swallow holes in which surface-water disappears, and which are numerous in Herts. Probably the best known are those in North Mymms, which can easily be seen at Water End; here the drainage of some 20 square miles of the county is lost. Swallow holes are found in two sets of conditions: along the junction of the Tertiary beds and chalk, and in the chalk itself, where the saturation level is below the bottom of the valley. The former are active at all seasons, the latter may not be. Directions are given for finding good examples. There is also an interesting discussion on the effect of pumping on the adjacent wells.

A PAPER by Mr. S. H. Warren on "A Natural 'Eolith' Factory beneath the Thanet Sand" (Quart. Journ. Geol. Soc., London, vol. lxxvi., p. 238, 1921), has already raised considerable discussion. It is clear that many persons would have accepted Mr. Warren's naturally flaked specimens as eoliths had their early Eocene age and their mode of origin not been demonstrable. The specialists in eoliths, on the other hand, maintain that the natural product, due to interaction under earth-tremors, is inartistic compared with an eolith for which human origin can reasonably be claimed. Mr. Warren's "natural factory" occurs at Grays in Essex.

IN a short paper of four pages, reprinted from the Proceedings of the U.S. National Academy of Sciences for June, 1920, Prof. A. G. Webster, of Clark University, directs attention to a necessary connection between the equation of state of a gas and the specific heats of the gas at constant pressure and at constant volume which does not take the simple form given to it by some authorities. In particular, he shows that a characteristic equation of the form $T=pf(v)$ does not indicate that the two specific heats are independent of the pressure; on the contrary, neither of them is a constant or independent of the pressure, nor is their difference constant, although it is independent of the pressure. Such a gas has no cohesion pressure, although it may have a finite Joule-Kelvin effect. In the same way a gas having a characteristic equation of the form $T=vF(p)$, although it has a zero Joule-Kelvin effect, has specific heats which are neither constant nor independent of the pressure. In conclusion, Prof. Webster expresses the opinion that the present method of teaching thermodynamics by means of the equations of the ideal gas or of the van der Waals equation "is by no means conducive to clearness."

WE have received from the Decimal Association a pamphlet entitled "The High-Value Penny," in which a proposal is put forward to increase the token value of the penny and employ the existing penny, halfpenny, and farthing coins to represent values 20 per cent. higher than at present, thus dividing the shilling into ten pence instead of twelve, while leaving the values of the shilling and the £ sterling unaffected. All the existing notes and silver coins would be retained at their present values, and the sixpenny and threepenny coins employed as half-shilling and quarter-shilling pieces exchangeable into 5 and 2½ high-value pence instead of 6 and 3 low-value pence respectively. At convenience the unpopular silver threepenny piece could be withdrawn from circulation and a more useful nickel twopenny piece issued. It is claimed that by the adoption of this proposal the purchasing power of the penny would be brought into closer harmony with modern needs. Owing to the absence of a coin intermediate in value between 1*d.* and 1½*d.*, the price of articles sold at 1*d.* before the war has been increased earlier than necessary to 1½*d.*, and will be retained longer than necessary at this figure when prices are falling. The chief defects of the recent decimal coinage proposals would be avoided by continuing to reckon in pence instead of in mils, and no new coins or knowledge of decimal arithmetic would be required.

IN the *Meteorological Magazine* for May Dr. C. Chree gives a brief account of "Recent Work on Aurora." The subject was suggested to him by the installation of an observatory in Shetland, one of its objects being auroral observations. Due acknowledgment is made of the work done by Norwegian physicists. Arcs and curtains are said to be the most frequent forms of aurora portrayed, and many, if not all, are built up of rays. Illustrations are given both from drawings and from a photograph, the preference being given somewhat to the former method, although reference is made to the method devised by Prof. Störmer of measuring auroral heights by taking photographs simultaneously from the two ends of a base, the inclusion of stars determining the position of the aurora in space. Reference is made to the exceptional occurrence of aurora in England, whilst it is said that in high latitudes aurora seems to be the rule, rather than the exception, when the sky is free from cloud and the absence of strong moonlight permits. It is suggested that the spectrum of aurora at different heights may add to our knowledge of the composition of the atmosphere and throw light on the electrical conditions of the air, whilst relations to wireless phenomena are also foreshadowed. The occurrence of aurora, associated with the sun-spots in May, although apparently of little importance in England, may in more northern latitudes afford useful information.

WE understand that part 1 of vol. iv. of "Annual Tables of Constants and Numerical Data: Chemical, Physical, and Technological," is now ready. The work since 1910 has been published under the patronage of the International Union of Pure and Applied Chemistry. Copies are obtainable from M. Ch. Marie, 9 rue de Bagneux, Paris 6e.

MR. W. H. ROBINSON, 4 Nelson Street, Newcastle-upon-Tyne, has just circulated a lengthy catalogue (No. 3, 1921) of upwards of 1000 second-hand books. The contents are of a varied character, but many items should be of interest to readers of NATURE, *e.g.* a number of books illustrated by Thomas and John Bewick, folk-lore publications, and those in the large section devoted to science and technology. The prices asked appear very moderate.

Our Astronomical Column.

OCCULTATION OF VENUS.—A daylight occultation of Venus will take place on Saturday morning, July 2 (civil reckoning). The planet's stellar magnitude will be −3·9, and it should be plainly visible to the naked eye, especially with the lunar crescent as a guide. The following table is extracted from the B.A.A. Journ. for May, p. 302:—

Place	Summer time of				Angle from N. Pt.		Altitude	
	Disap.		Reap.					
	h.	m.	h.	m.	°	°	°	°
Greenwich ...	5	3·4	6	9·5	67	262	23	33
Edinburgh ...	5	11·8	6	14·2	58	273	22	31
Liverpool ...	5	6·6	6	10·4	62	268	22	31
Dublin ...	5	6·3	6	8·2	59	271	20	29

The times are for the centre of Venus; they should be diminished by about 0·5m., owing to the error of the moon's place. Venus will be just half-illuminated. The occultation (disappearance and reappearance) of the illuminated limb will take place about 28s. later than the centre. Accurately timed observations of the different phases will be of use for correcting the places of moon and planet.

Circular No. 10 of the Cracow Observatory gives full details of the circumstances for about 400 stations spread over Europe. These circulars are written in Prof. G. Peano's "Latino sine flexione," which is easily read by anyone with an elementary knowledge of Latin or the derived languages.

THE TOTAL AMOUNT OF STARLIGHT.—Prof. Newcomb pointed out the importance of ascertaining the total amount of light given to us by all the stars, including those that are altogether invisible as units in the largest telescopes. It is only in this manner that limits can be fixed to the amount of light given by the fainter and more distant stars. Prof. Newcomb himself made observations for this purpose (*Astrophys. Journ.*, vol. xiv.); he was followed by Mr. G. J. Burns (*Astrophys. Journ.*, vol. xvi.), Mr. L. Yntema (Groningen Publications, No. 22), and Dr. P. J. Van Rhijn. The last-named has now made a new and more complete research (Groningen Publications, No. 31), utilising the experience previously gained, and analysing the total skylight into its components. An artificial star of magnitude about 5 was used, formed by reflection from a bulb; its light was compared with that of standard stars, and then spread out by changing the focus until it became equal to the skylight. The observations were made at Mount Wilson; the nearest towns were distant 13 km. and 26 km., and the effect of their lights was found to be inappreciable above altitude 35°. Use was made of the star counts in different galactic latitudes to estimate the increase of starlight as the galaxy is approached. The final result is that the total starlight is equal to 1440 first magnitude stars (Yntema found 1350), and that the skylight is made up as follows:—Starlight, 17 per cent.; zodiacal light, 43 per cent. (this varies at different hours of the night); perpetual aurora, 15 per cent. (it is noted that Prof. Slipher found the green auroral line on all photographs of the sky spectrum); the preceding sources scattered by the atmosphere, 25 per cent. The starlight has been reduced to the zenith by the application of Abbot's coefficients of atmospheric absorption. The starlight per square degree in various galactic latitudes is:—Lat. 0°, 0·085; lat. 10°, 0·065; lat. 20°, 0·044; lat. 30°, 0·026; lat. 40°, 0·015; lat. 50°, 0·014; lat. 60°, 0·012; lat. 70°, 0·011; lat. 80°, 0·010; and lat. 90°, 0·010 (the unit is mag. 1·0).

PERIODICITY OF VARIABLE STARS.—In order to facilitate further research on the cause of the periodicity of variable stars, Dr. J. G. Hagen has collected together in the May number of *Scientia* the salient differences between the stars of period less than three months and those of greater period. The short-period stars change less than 1·5 magnitude, while those of long period change three or four magnitudes. For the former the minima are sharp, followed by a rapid recovery, while for the latter the minima are flattened and the recovery relatively slower. The long periods oscillate, while the short change in the same direction with time. The former collect about 300 days, the latter about half a day and five days. The long-period stars are generally orange-red in colour and are spread evenly over the sky, while the short-period stars are whitish-yellow and collect in the Milky Way.

Dr. Hagen looks forward to the appearance of the results of the Mount Wilson measurements with the new 100-in. telescope, and hopes that it will then be possible to test whether the phenomena can all be explained by the theory that the variable stars are binaries.